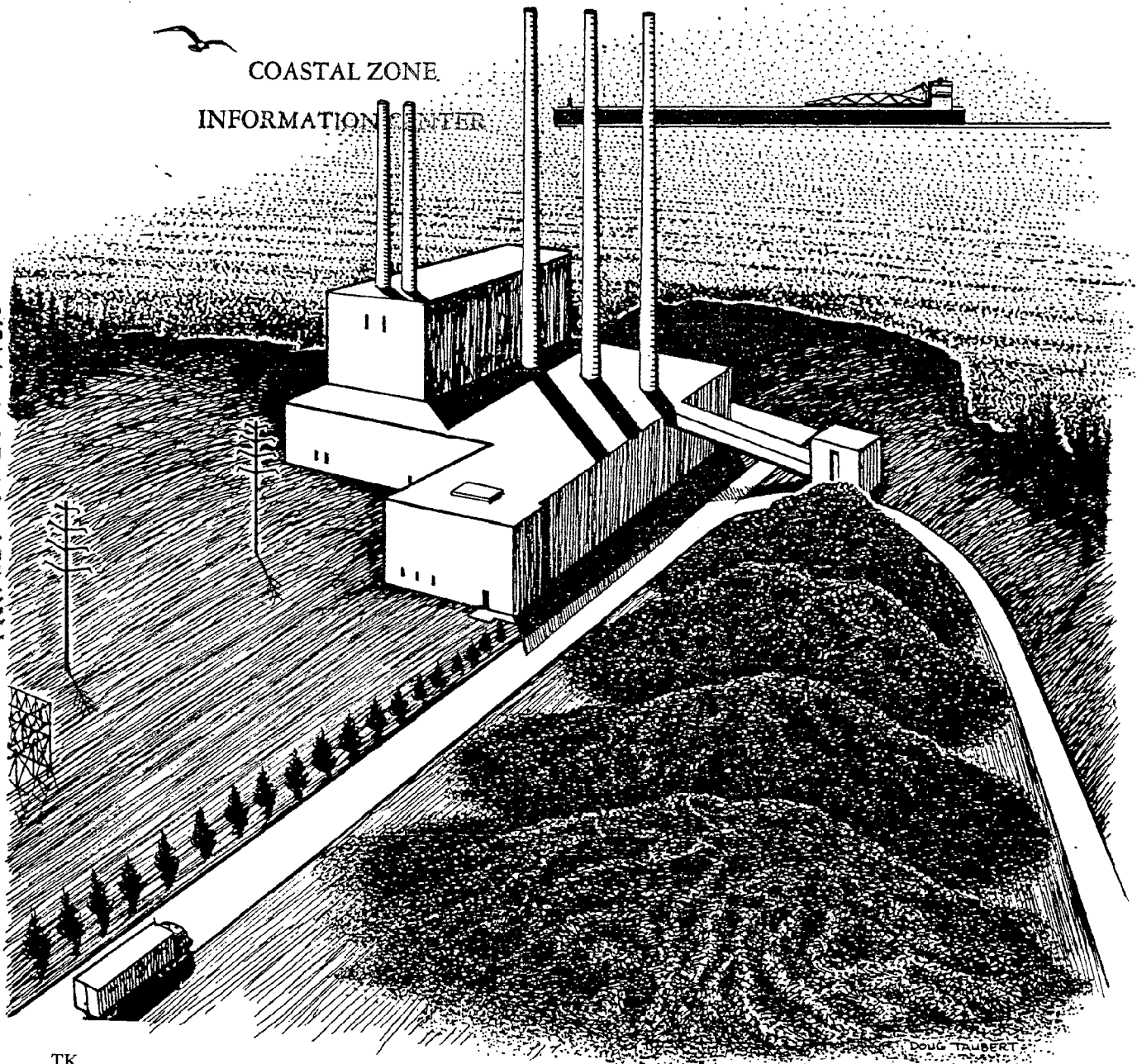


Energy Site Impacts

TOWN OF STURGEON BAY

COASTAL ZONE
INFORMATION CENTER



TK
1225
.S78
E54
1982

BAY-LAKE Regional Planning Commission

serving communities within the counties of:

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Western Coastal Zone Management Program
TK1225.S78E54 1982

400 MW COAL FIRED POWER PLANT PROJECT

DESCRIPTION OF PROPOSED ACTION

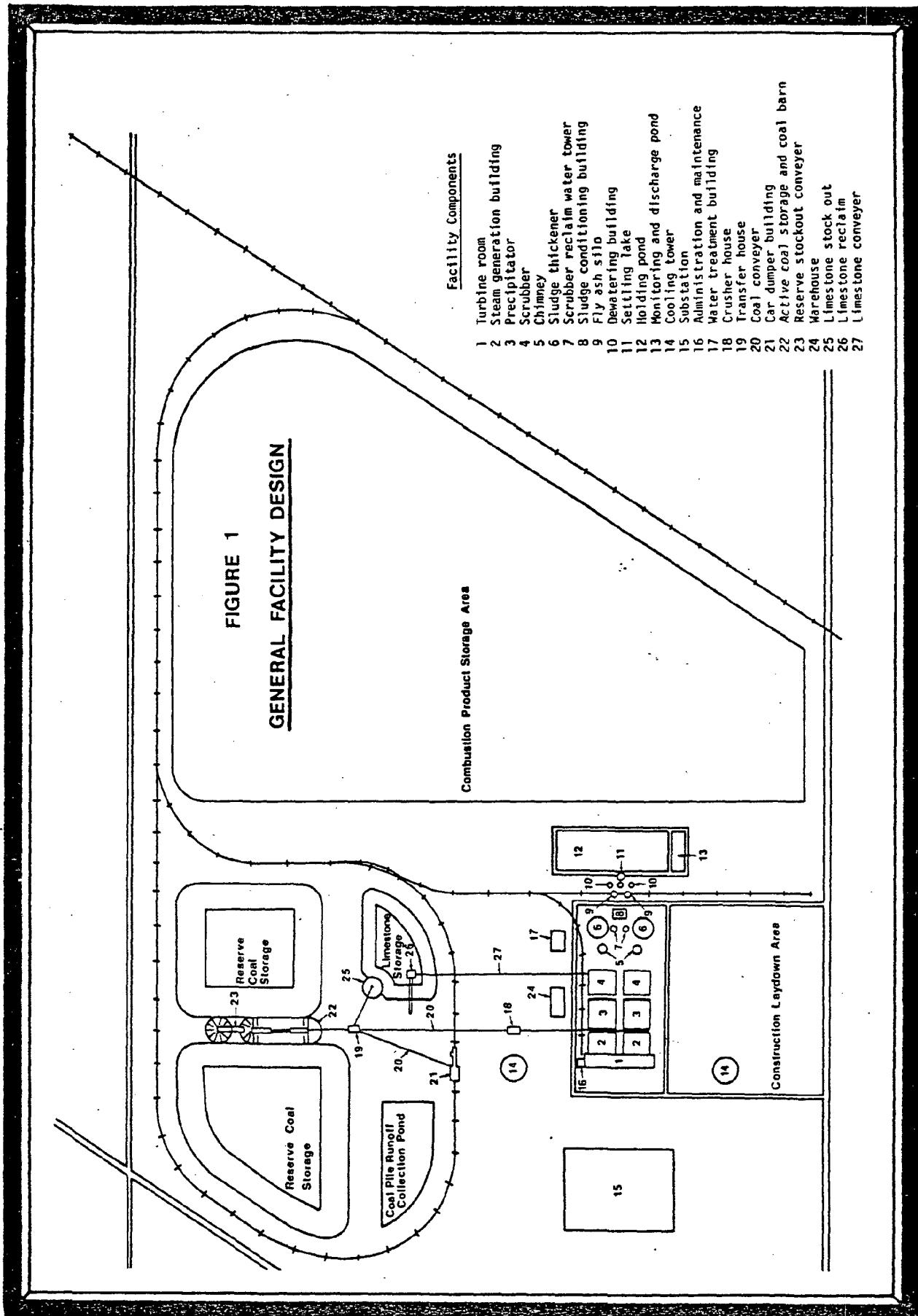
Utilities often work in cooperation with each other to help fulfill electric demands. Utility power planning groups identify future goals and needs, and plan together to meet them. The normal procedure in power plant construction is for each utility to take its turn in building a larger sized plant to furnish power to meet its own needs and the needs of the other utilities at the time the plant begins operation. Within a few years, the utility needs all of the power from the new plant and other utilities must buy from someone else.

Wisconsin Public Service Corporation (WPSC) has combined its efforts with three other Wisconsin utilities companies in forming a planning group called the Eastern Wisconsin Utilities (EWU). Each company does its own power demand forecasting, but through the EWU a coordinated plan is completed that identifies generating systems which will provide an adequate and reliable supply of energy in the future. WPSC has proposed that a 400 megawatt coal fired electric generating facility be constructed and in operation by 1992. Three sites were originally selected to be evaluated from a technical and economic point of view. They included sites in the Town of Lawrence, Brown County; Town of Oconto, Oconto County; and the Town of Eau Claire, Portage County. Although the Town of Sturgeon Bay was not selected as one of the three potential sites by WPSC, it was felt that since WPSC did own a 426 acre parcel, an inventory of the area was appropriate. Wisconsin Public Service Corporation has recently named the Town of Lawrence as its primary site and the Town of Oconto as its secondary choice.

The original report from Wisconsin Public Service Corporation to the Wisconsin Public Service Commission identified 35 potential sites. The selection criteria applied during site analysis eliminated all but three of the originally named sites. Among some of the major criteria reviewed for each facility are hydrology, geology, meteorology/air quality, ecology and land use. Of the three final sites, the Town of Lawrence was chosen as the primary site and the Town of Oconto as the alternate site. In-depth studies such as the environmental impact statements, and soils and hydrology testing will soon be initiated. Following the completion of the studies any necessary changes that must be made to the construction plans of the power plant to be sure the plant operates in harmony with the environment will be undertaken as early as possible.

Type of Facility - Main Components

The facility planned by WPSC will be a modern, technically advanced plant. A general description of the operation and identification of the major components will illustrate WPSC's efforts to generate electricity as cleanly as possible. A plant layout is graphically displayed in Figure 1.



Two generating units were originally planned to produce 600-800 megawatts (i.e., 300-400 megawatts each). Due to reduced demand, a 400 MW plant will be constructed; however, the site will be prepared to house the second unit for future expansion. Each unit will be housed in separate buildings and will maintain individual components. However, a common turbine room, sludge conditioning room and the transformers will be designed to serve both units.

The turbine room is located adjacent to the steam generating building, and can be operated by either one or both units. Coal is burned here to produce the steam that drives the turbines. The precipitator, which is located next to the generating building, collects the particulates (fly ash) from the emission. The emission then passes through a spray type sulfur dioxide scrubber where a wet spray removes pollutants from the gas stream by means of chemical reactions. Scrubbers also serve to cool emission temperatures. Emissions are then released through a 550 foot high smoke stack. The next few steps prepare the sludge and fly ash for safe storage.

The cooling system for a 400 MW facility operating at full capacity will require approximately a 200,000 gpm flow of circulating water through the condenser to absorb excess boiler heat. The cooling water is then circulated into a mechanical draft cooling tower to dissipate the absorbed heat before being recycled back into the system. A mechanical draft cooling tower stands approximately 60 feet high. Because of the compactness of the unit, fans will be used to help the cooling process. The system creates noise, uses electrical energy and releases large amounts of water vapor (approximately 4000 gpm at maximum operation). Makeup water is expected to come from Lake Michigan.

Separate handling systems and storage areas will be provided for coal and limestone. Limestone which is necessary for the scrubbing process will be stored near the scrubbers. Limestone will be reclaimed from storage by utilizing underground reclaim hoppers and conveyed to the limestone preparation facility located near the scrubbers. The coal handling system is very similar, with the exception of being conveyed to the steam generating area rather than to the scrubber.

The electrical power produced by the generator is converted to a useable power, monitored, controlled and released to powerlines at the power plant's substation. This area contains the switchboards, switches, wiring, fuses, circuit breakers, compensators and transformers.

Solid Waste Disposal Landfill

One of the most troublesome issues to most power plant planners is the disposal of solid wastes. Approximately 170,000 to 175,000 tons of sludge and ash will be produced each year. Compounds that make up the

wastes can be detrimental to surface water and groundwater, so special care must be given to line the disposal site with impermeable liners. Various sealing materials can be used; clay, bentonite, synthetic liners, and stabilized fly ash and scrubber solids are among the most common. A bentonite, synthetic liner or a clay liner will be used at this proposed facility. Cover materials must also be applied to prevent the ash from becoming airborne.

Most power plant plans now require the solid waste disposal area to be located on site to reduce shipping costs. An estimated 250 to 325 acres will be required for the disposal area. The Sturgeon Bay site is not large enough to house the landfill, and would have to be located off site. WPSC did take soil samples around the site for this purpose, although the site was not officially selected as a potential location for the power plant. Studies are in progress that are trying to determine uses for these byproducts. Currently, a small market exists for use of fly ash as an ingredient for concrete and cement products. Western coal has a higher sale potential because of its high content of calcium. Further long-term research is necessary, however, to make sure that the fly ash component is not detrimental to the environment.

It takes three to four years to construct a power plant. During this period 450-550 people may be employed, mostly through the construction trades. Most of the skilled workers are needed for three to twelve months to complete certain functions before being replaced by workers with new skills and trades. The construction phase is long enough that short-term housing may have to be found for many of these employees, especially at the sites located in small rural communities, where the work force will have to be brought in from other locations. Impacts upon schools, housing and local services may be experienced for temporary time periods. When the construction phase is over, employment at the facility will be reduced to 70 permanent employees. Communities should be prepared for changes during and after the installation of a major electrical generating facility.

Most of the information for this segment came from planning documents drafted by Wisconsin Public Service Corporation, particularly their 1978 and 1981 Site Analysis. Since construction of this project is not scheduled to begin until 1988, it is reasonable to expect that some changes will be made in these plans.

PHYSICAL ENVIRONMENT

LOCATION

Nearest Town	Sturgeon Bay
USGS Map 15' Series	Sturgeon Bay
Township	27N
Range	27E
Section	22

Overview of the Sturgeon Bay Site

The site in the Town of Sturgeon Bay comprises 426 acres and is entirely owned by Wisconsin Public Service Corporation (WPSC). It is located on Lake Michigan and the Sturgeon Bay Canal approximately two miles east of the City of Sturgeon Bay, in Door County. Map 1 delineates the site location. The site includes all of section 22 that is located south of the canal. Only local roads make the site accessible to other areas and no rail system serves the site. The site does, however, have an abundance of navigable water abutting the property.

GENERAL DESCRIPTION

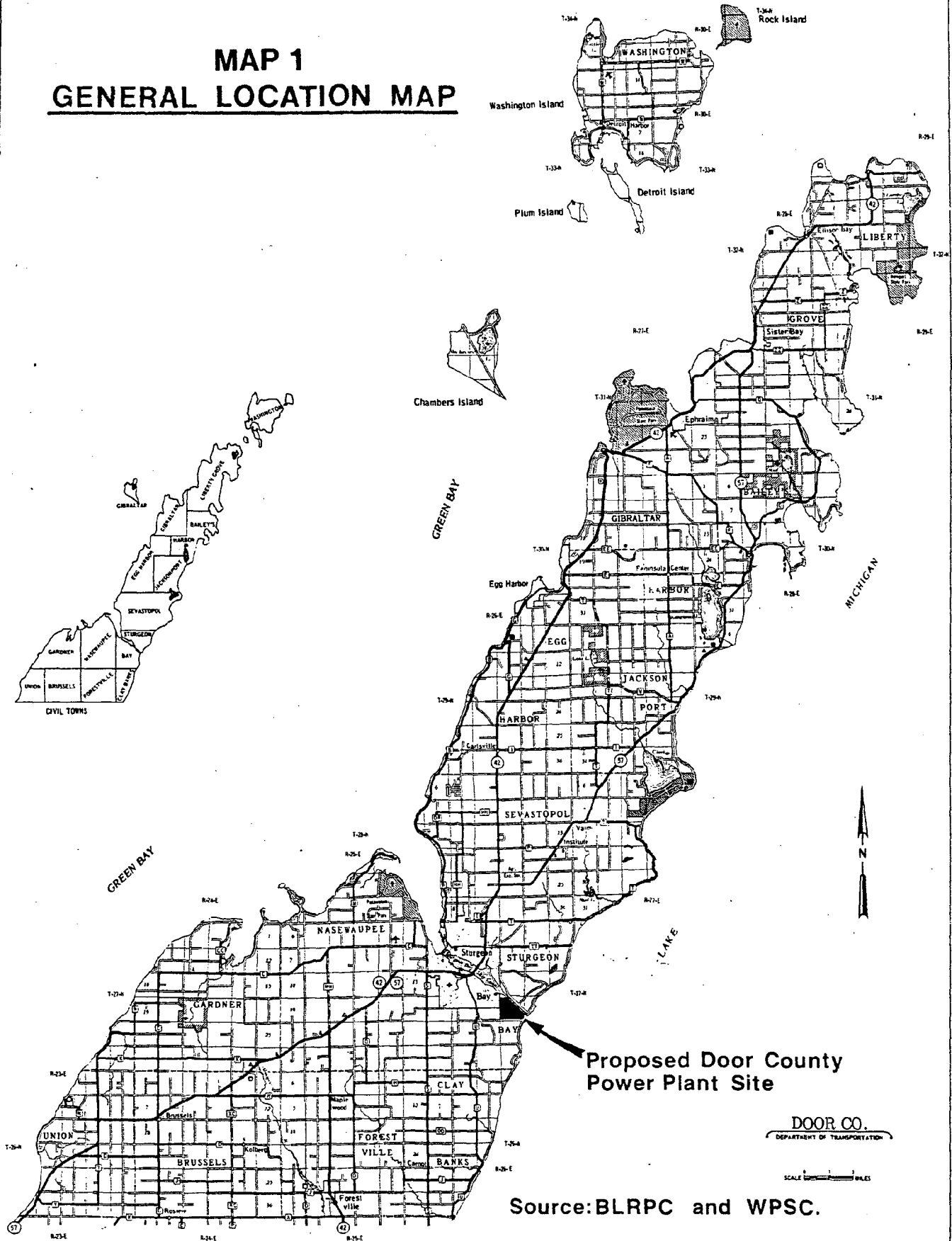
Bedrock

Bedrock is the major influence in the amount of groundwater available in a given area. If the bedrock has a low water yielding capacity, a facility such as being planned at this site may be somewhat limited in some aspects of operation. For instance, the Weston 3 power plant in Marathon County requires a maximum of 192,000 gallons of groundwater per 24 hour period, for various purposes. Other than the accessibility and quantities of groundwater being dictated by bedrock, it also dictates potentials and limitations of surface and subsurface water movements, and is also an important consideration for the location of solid waste and hazardous material disposal sites.

This particular site is underlain by six bedrock groups. The top layer is the Silurian Dolomite, the thickest of all the groups at approximately 470 to 490 feet thick. This dolomite is also known as the Niagaran escarpment and has a relatively low capacity of water; it does, however, usually yield enough for domestic use. Beneath the Silurian is the Maquoketa Shale. The Maquoketa Shale is probably at its thickest near the site at approximately 350 feet. This shale also has a poor water yielding capacity.

The third bedrock is the Platteville-Galena Dolomite group which lies about 850 feet below the surface and is about 200 feet thick. This dolomite group, as is characteristic of all dolomites, has poor water

MAP 1 GENERAL LOCATION MAP



bearing capabilities and cannot be considered a high capacity source of water. The St. Peters Sandstone is the fourth bedrock layer, and is 160 to 180 feet thick. Sandstone is a good source of water, but the depth of the St. Peters formation would prevent the tapping of water for domestic use and the formation may not yield the quantity of water that would be required by the proposed facility. The Prairie du Chien group is another dolomite group and is only about 75 feet thick. The Cambrian Sandstone lies approximately 1400 feet below the surface. It is a good source of groundwater with a capacity of 500 to 1000 gallons per minute. See Figure 2 which delineates a cross section of the bedrock geology of the site.

Glacial Deposits

In the process of four major glacial movements in Wisconsin, glacial debris was deposited on the existing bedrock. As the glaciers melted, the landscape that exists today was formed. The Door County Peninsula has varying thicknesses of this glacial deposition ranging from approximately 10 to 200 feet. In the location of the site, the thickness is only 30 to 40 feet of sand and gravel. This composite of sand and gravel has the potential of yielding large amounts of water.

Glacial deposits are also parent materials for existing soils of the same area. See Figure 2 for the diagram for glacial drift.

Soils

The 426 acre Sturgeon Bay site contains approximately six different soils. These soils are illustrated in Map 2. Nearly one-half of the site has soils from the Rousseau series which can be found in the entire eastern half of the site. Rousseau is a fine sandy type soil that is a poor producer of grain and seed crop, but is fair to good for growing herbaceous plants or hardwood trees.

Other soils that make up large parcels of the site include the Wainola soils which are located in the west central area. This soil is a fine sand that has fair capabilities for crop growth and is good for hardwood growth. Another soil series that makes up a large portion of the site is the Cathro soil located along the western boundary. Cathro is a sandy loam, and is poor for raising crops. Yahara also is a fine sandy loam, but has good crop growing capabilities.

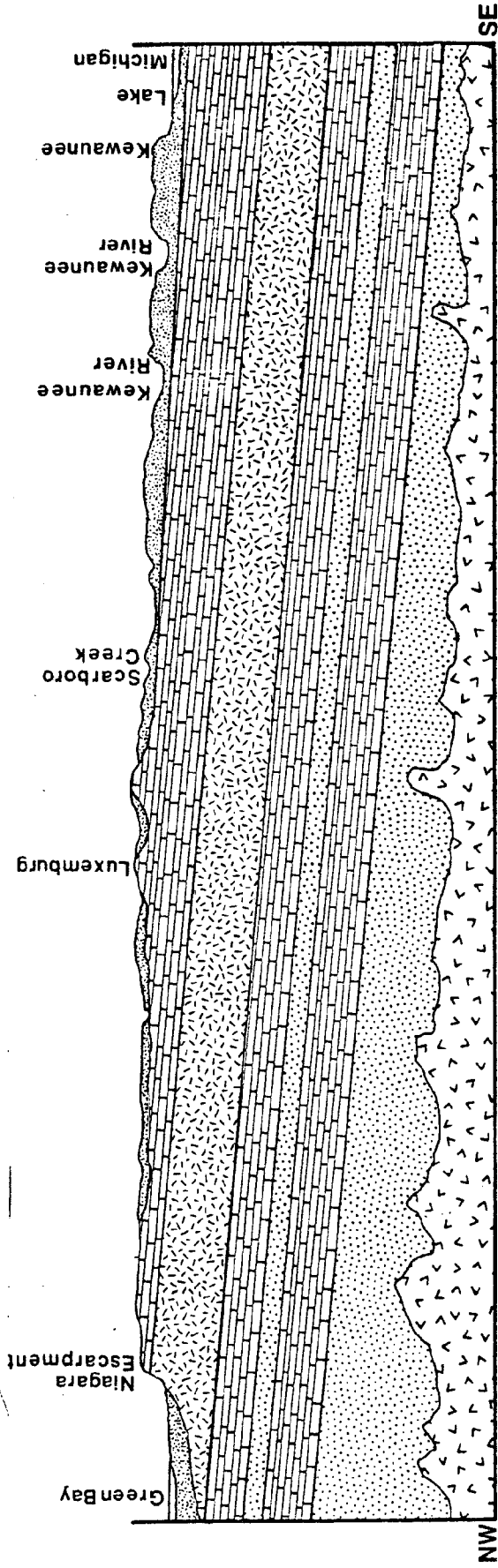
The remaining soils, Carbondale & Deford are located in the western one-third of the site. Characteristics and sizes of the soil parcels on this site can be found in Table 1.

Water Table

As shown in Map 3 nearly one-half of the site has a relatively high water table. Classification of the water table varies somewhat, but for the purpose of this site 0-2' depth of the water table is wetland, 2'-5' is

FIGURE 2

GENERALIZED CROSS SECTIONAL VIEW OF THE DOOR PENINSULA



ONE INCH = 2.5 MILES

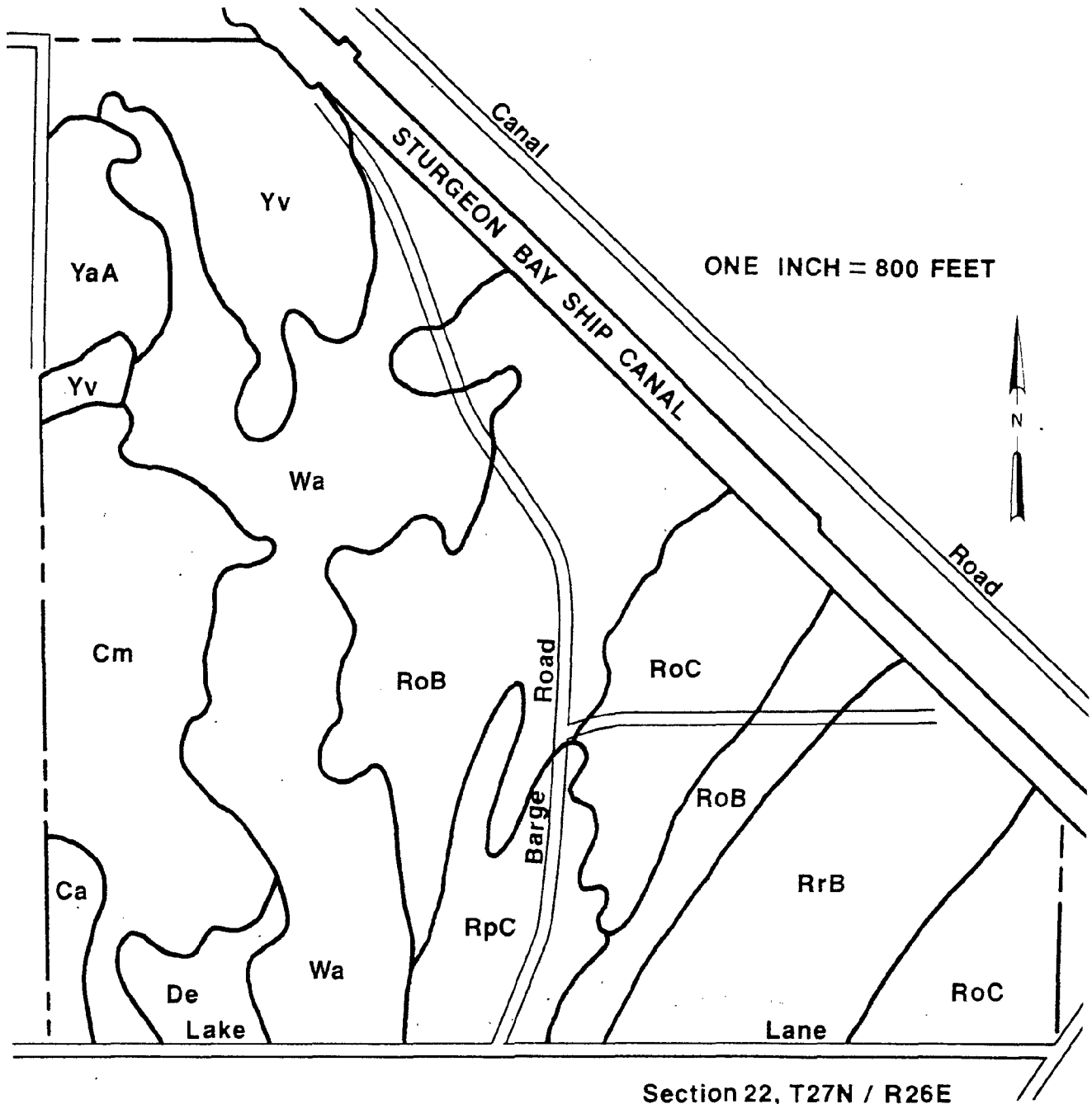
LEGEND

ROCK TYPE	GEOLOGIC TIME PERIOD	MILLIONS OF YEARS AGO
GLACIAL DRIFT	QUATERNARY (PLEISTOCENE)	0-2
SILURIAN DOLOMITE	SILURIAN	405-425
MAQUOKETA SHALE	ORDOVICIAN	425-500
PLATTEVILLE-GALENA DOLOMITE	ORDOVICIAN	425-500
ST. PETER SANDSTONE	ORDOVICIAN	425-500
PRAIRIE DU CHIEN DOLOMITE	ORDOVICIAN	425-500
CAMBRIAN SANDSTONE	CAMBRIAN	500-600
GRANITE AND OTHER CRYSTALLINE ROCK	PRECAMBRIAN	3,800

SOURCE: F.T. THWAITES AND KENNETH BERTRAND; PLEISTOCENE GEOLOGY OF THE DOOR PENINSULA, WISCONSIN.; U.S.G.S. HYDROLOGIC ATLAS HA-432.

MAP 2
SOILS MAP

PROPOSED DOOR COUNTY POWER PLANT SITE



For soil descriptions see Table 1.

Source: Door County Soil Conservation Service.

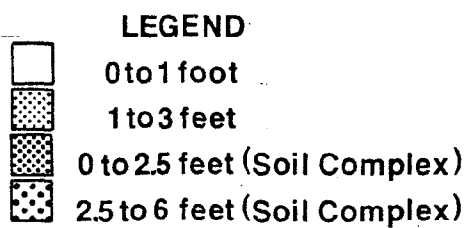
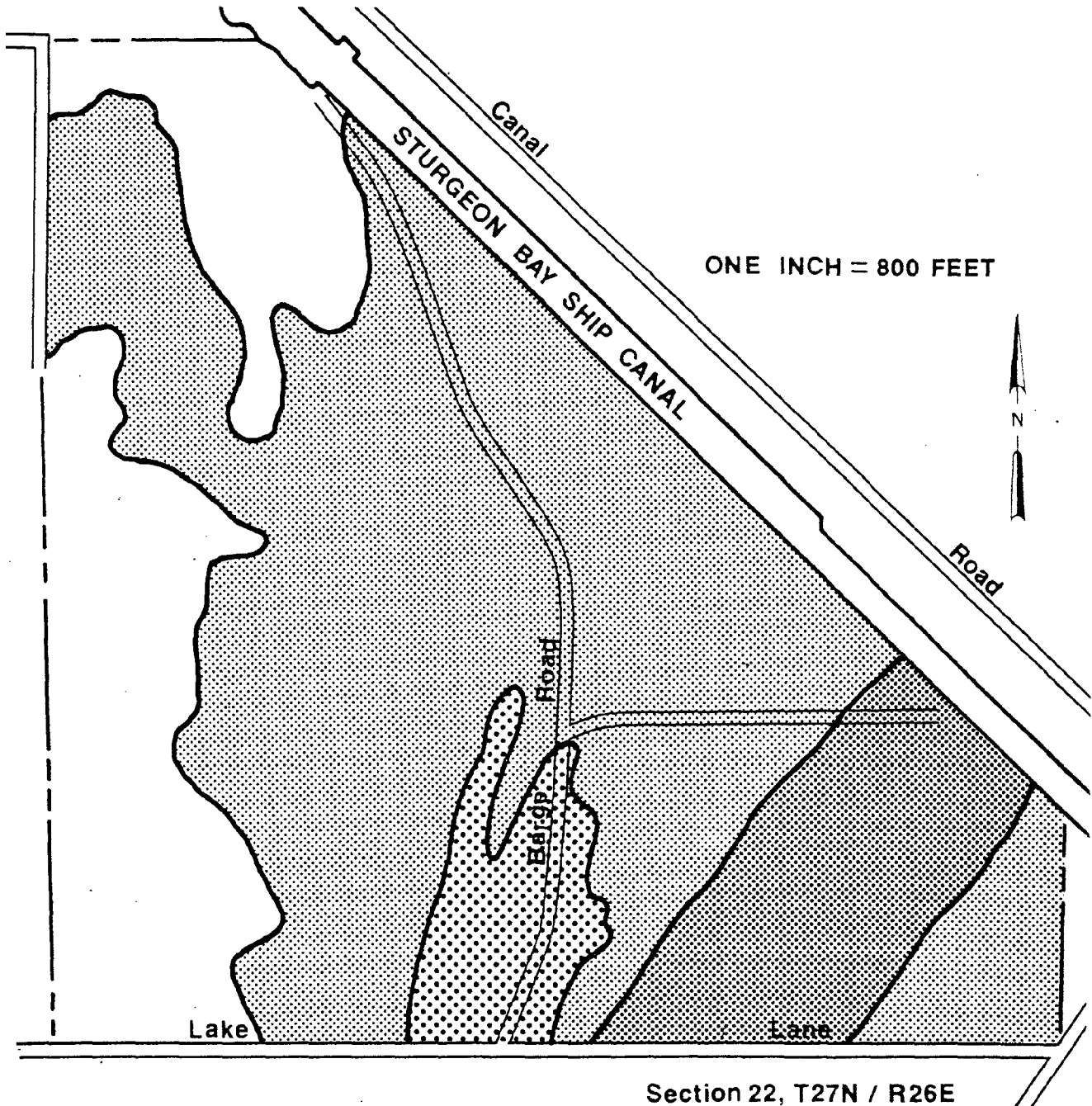
TABLE 1
SOILS LOCATED ON THE STURGEON BAY SITE

Soil	Slope	Acres	Depth to Water Table	Septic Limitations	Landfills Limitations
Ca - Carbondale Muck	0-2%	5	0-1 ft.	Severe	Severe
Cm - Cathro Muck	0-2%	55	0-1 ft.	Severe	Severe
De - Deford Loamy Fine Sand	0-2%	12	0-1 ft.	Severe	Severe
RoB - Rousseau Fine Sand	2-6%	75	2.5 ft.	Slight	Severe
RoC - Rousseau Fine Sand	6-12%	57	2.5 ft.	Moderate	Severe
RpC - Rousseau-Shawano part		28			
Rousseau Fine Sand	2-12%		2.5 ft.	Slight	Severe
Shawano Fine Sand	2-12%		6 ft.	Slight	Severe
RrB - Rousseau-Deford part		55			
Rousseau Fine Sand	2-6%		2.5 ft.	Slight	Severe
Deford Fine Sand	2-6%		0-1 ft.	Severe	Severe
Wa - Wainola Loamy Fine Sand	0%	88	1-2 ft.	Severe	Severe
YaA - Yahara Variant Silt Loam	0-3%	26	1-3 ft.	Severe	Severe
Yv - Yahara Fine Sandy Loam	0%	27	0-1 ft.	Severe	Severe

Source: Department of Agriculture; Soil Conservation Service.

MAP 3
DEPTH TO WATER TABLE

PROPOSED DOOR COUNTY POWER PLANT SITE



seasonally high water table and greater than 5 feet usually has no high water problems. Half the site is the Rousseau soil which is a fine sand, and has a water table located 2.5 feet deep or greater.

High water tables may cause problems for certain aspects of the power plant facility. For instance, the coal unloading unit is a deep structure and because of the large quantities of groundwater, construction activities may be more sensitive and expensive. The generating facility will be built with some sort of supportive foundation, most likely either mat foundation or pile supported foundations. The site is too small to house a solid waste landfill, however, soil tests in other areas have been taken to find an area for the landfill.

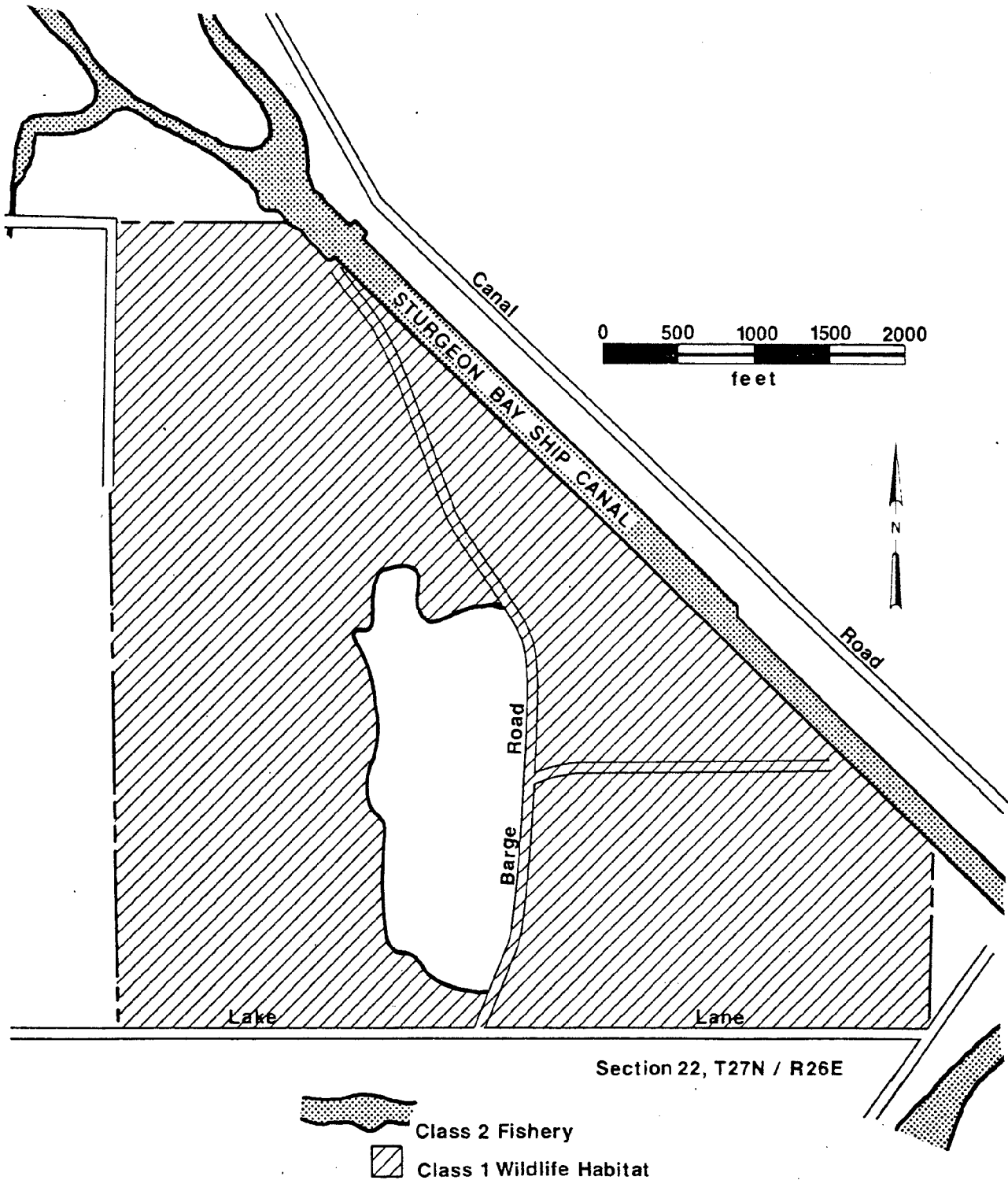
Fish and Wildlife

Sturgeon Bay and the Sturgeon Bay Canal are immediately adjacent to the proposed site. The bay supports a resident fish population of sport and commercial species, but the Wisconsin Coastal Atlas, 1977 indicates no resident or spawning species in the canal. Lake Michigan, adjacent to the site, however does support resident sport and commercial fisheries. Before any conclusions on the potential impacts that the power plant may have on local fisheries, an Environmental Impact Statement must be completed. This would be done if this site were chosen to house the facility. Map 4 shows local fisheries.

The entire site has been classified a natural area by the Coastal Atlas, and with the exception of utility easements and roads on site, all the acreage is woodland, wetland or grassland. This lack of human development provides desirable wildlife habitat. The Wisconsin Coastal Atlas confirms this by rating all but the central grasslands as a most desirable wildlife habitat. This means there is a major range of species and the habitat is of high quality. Map 4 shows the locations of habitat on site.

MAP 4

FISH AND WILDLIFE HABITAT



Source: Wisconsin Coastal Management.

SOCIAL ECONOMIC ENVIRONMENT

POPULATION

The 1980 U.S. Census records the population of Door County at 25,029 persons, which ranks Door County sixth among the Bay-Lake region counties. The county does, however, have a 24.48% growth increase since the 1970 U.S. Census. This statistic ranks Door only behind Florence County in the Bay-Lake region in percentage growth rate. Most of the population growth took place in the City of Sturgeon Bay and the villages of Door County. All of the incorporated areas except the Village of Sister Bay had about a 30% increase. The growth rate by town is shown on Map 5. No area in Door County decreased in population during this ten year period.

EMPLOYMENT

Data from the Department of Industry, Labor and Human Relations (DILHR) estimated a workforce of 14,600 persons in Door County as of February 1981. The same data showed 1,090 of these people unemployed, for a 7.4% unemployment rate. The unemployment figure is up 1.8% from the previous February.

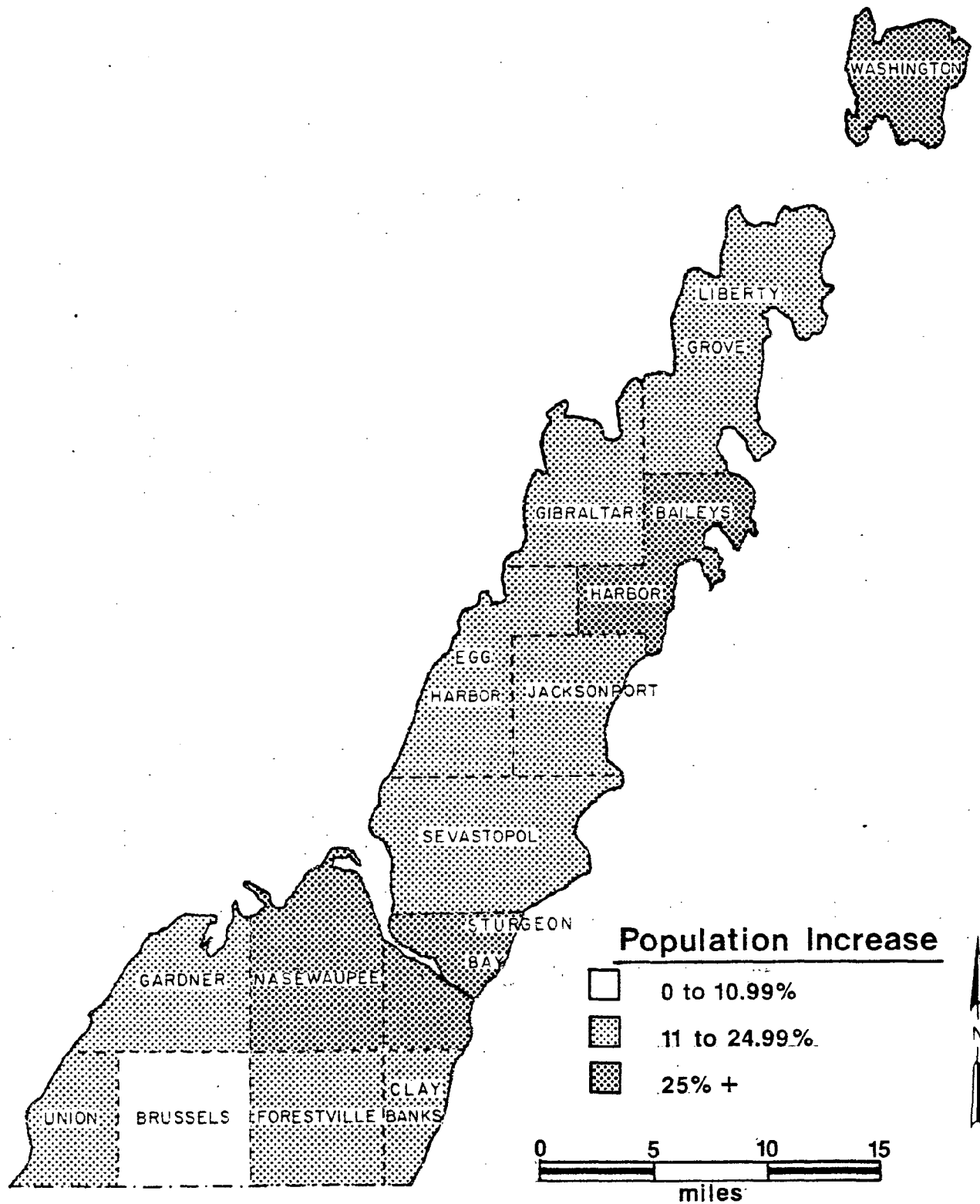
The major employment sector is transportation products, which incorporates the shipbuilding industry, where nearly one of every five county employees are employed. Other large employment sectors are the wholesale-retail trades, government and services and miscellaneous. All four of these sectors either remained the same or increased from the year before. See Table 2 for employment in the county.

The Town of Sturgeon Bay and the City of Sturgeon Bay will be used as the specific study area since the site is located in the town and the city is near to the site, and has a large workforce available. The Town of Sturgeon Bay has 167 persons in the labor force with the largest sector being in agriculture, forestry and fishing. The city has a workforce of 7,481, and over one-half are employed in manufacturing. See Table 2 for employment by sector.

INCOME

Door County's average weekly wage (AWW) ranks fifth in the Bay-Lake region according to WDILHR's Second Quarter 1980 Employment and Wages Report. However, since a similar 1975 report, Door County has experienced a 33% increase in AWW, the highest in the region. It can, however, be seen that the AWW in the manufacturing sector, which provides 45% of Door County's job opportunities, remains below the state's AWW of the same sector. Table 3 shows average weekly income for county, region and state.

MAP 5 **DOOR COUNTY POPULATION CHANGE 1970 to 1980**



Source: United States Bureau of the Census; 1980 Census.

TABLE 2
EMPLOYMENT BY SECTOR*

Sector	Town of Sturgeon Bay	City of Sturgeon Bay	Door County
Manufacturing	11	3,904	3,990
Construction	5	188	391
Agriculture, Forestry, Fishing	77	8	98
Retail Trade	43	1,185	1,742
Finance, Insurance, Real Estate	1	184	226
Total Services	10	1,321	1,959
Government	1	414	487

* Table only includes larger employment sectors.

Source: Wisconsin Department of Industry, Labor and Human Relations;
Bay-Lake Regional Planning Commission

TABLE 3
AVERAGE WEEKLY WAGES
(2nd Quarter 1980)
COUNTY, REGION AND STATE

Sector	Door County	Bay-Lake Region	State of Wisconsin
Local Government	\$201.91	*	\$262.90
Agriculture, Forestry, and Fishing	184.73	*	196.04
Construction	301.11	*	351.21
Manufacturing	279.59	*	337.72
-Transportation Equipment	313.86	*	411.20
Transportation, Communication and Electrical Service	329.96	*	325.88
Wholesale Trade	235.15	*	313.81
Retail Trade	120.83	*	137.62
Finance, Insurance, and Real Estate	193.25	*	240.62
Services	143.02	*	197.04
Industries Total Average	214.70	218.75	260.23

* Data not compiled.

Source: Wisconsin Department of Industry, Labor and Human Relations,
Employment and Wages (Second Quarter 1975 & 1980)

COMMUNITY SERVICES

The City of Sturgeon Bay is the nearest community to the proposed site and would be impacted most by the construction of a power plant. For this reason, a few of Sturgeon Bay's community services will be inventoried. Other small communities located near the power plant site may wish to take an inventory of services so that potential problems can be identified. Communities should be concerned about providing adequate housing, sewer and water, schools, law enforcement and health care facilities. The following is a brief inventory of some of the City of Sturgeon Bay's services.

Water

The city has eight wells located in various parts of the city that supply the municipality with its water needs. The first well drilled for municipal use was in 1918, and the capacity continued to increase until the eighth well was drilled in 1966. The current capacity is over 5.5 million gallons/day. Sturgeon Bay also has four water storage facilities with a total capacity of 1.25 million gallons. All water is chlorinated and fluoridated before being used.

Each side of the bay has a separate water system with no connecting mains between them. The Sturgeon Bay Comprehensive Planning Program 1969, estimated that 80 percent of the water demand is from the east side and 20 percent is used on the west side.

The 1980 total water consumption from the municipal water facility was over 401 million gallons, which averages nearly 1.1 million gallons per day. This figure includes domestic, commercial and industrial use. Water demand for fire protection has an approximate requirement of 2.5 million gallons per day or a total of 3.6 million gallons per day. At this rate, the demand (3.6 mgd) should not exceed the supply (5.5 mgd) for many years.

Sewer

The Sturgeon Bay wastewater treatment facility was constructed in 1939. The system was built with separate storm and sanitary sewers. The primary sludge and waste activated sludge are pumped to two anaerobic digesters where the digestion gas is used in the boiler. In 1965 the sludge drying bed capacity was tripled. Again in 1968 and 1973 improvements were made to the system. Presently the system serves most of the developed areas of the city.

The facility discharges effluents into the Bay of Sturgeon Bay, while the sludge is hauled out and spread on agricultural land. During wet periods of the year, the wastewater collection system and associated interceptors do not have the capacity to handle existing waste loads. The facility is currently being upgraded and expanded to meet current and future demands.

Schools

The Sturgeon Bay School District maintains five schools and employs 82 full-time teachers. Reports distributed by the Department of Public Instruction show enrollment in the 1980-1981 school year is very similar to the 1972-1973 school year, 1,327 to approximately 1,320 respectively. Enrollment peaked in the mid-seventies before declining again to current enrollment. The school year 1976-1977 the enrollment went above 1,400 students. Fluctuations of students in this school district has not been very significant over the past decade compared to state averages.

Another aspect of the public school systems is the student-teacher ratio. The 1980-1981 school year has approximately one full-time teacher to sixteen pupils. This is comparable to the average school system in the state.

Recreation

The Door County Outdoor Recreation Plan 1974-1978 suggested that since the city is the social center of Door County, Sturgeon Bay is somewhat responsible for providing recreation for outlying areas. The plan found that the present facilities and recreation areas are adequate.

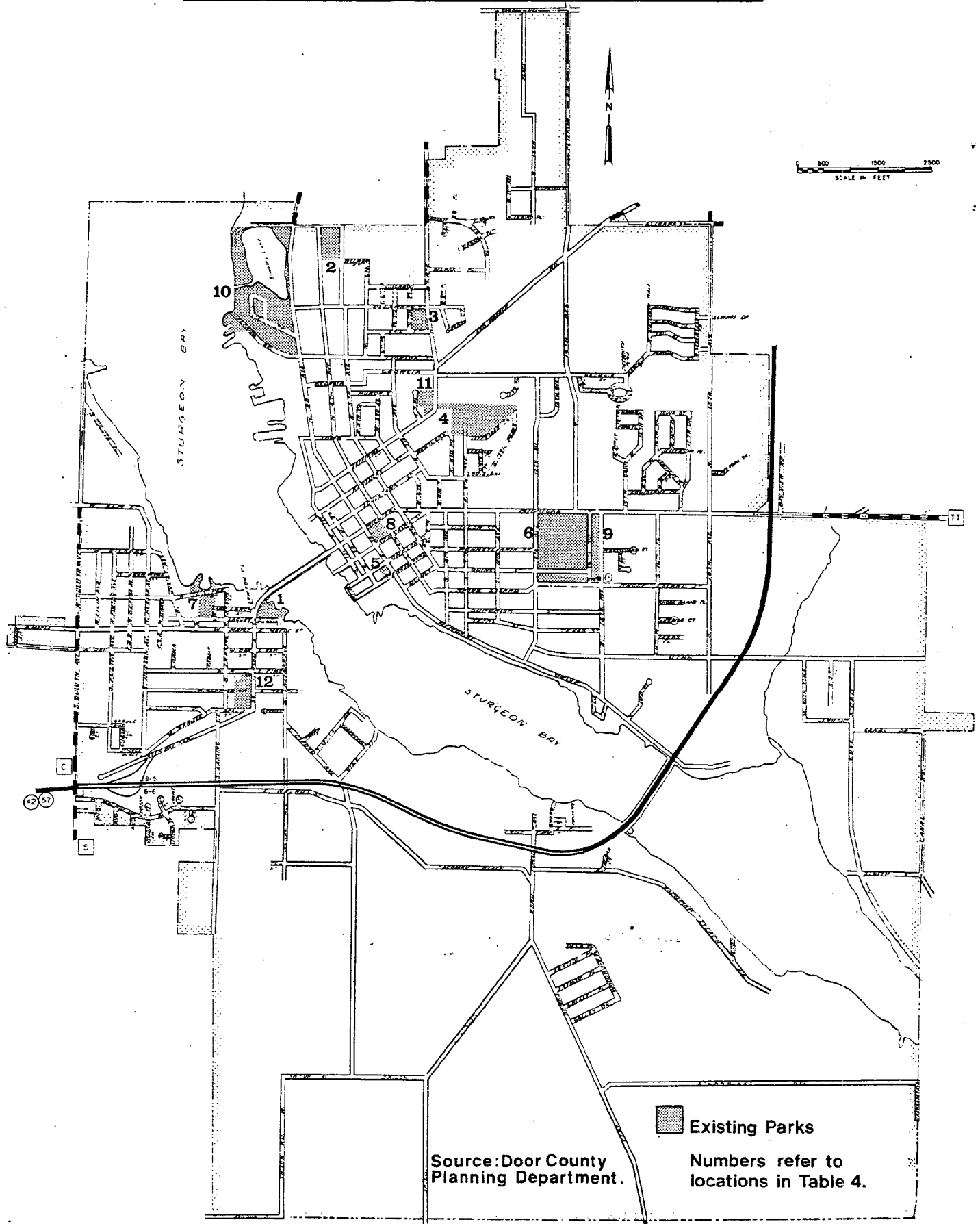
The park system is closely coordinated with the recreation and physical education programs in the school systems. Many school recreation facilities also serve as municipal parks. Twelve parks are available to area residents, Table 4 lists the parks with sizes, and Map 6 shows the location of each of the parks.

TABLE 4
STURGEON BAY PARKS

Name	Type	Acreage
1. City Dock	Special	1.8
2. Fourth Ave./Fifth Ave. Playground	Neighborhood	4.6
3. Garland Park	Neighborhood	2.1
4. Lawrence Big Hill Park	Neighborhood	9.9
5. Martin Park	Special	0.7
6. Memorial Athletic Field (including Athletic Complex)	Neighborhood	24.6
7. Otumba Park	Neighborhood	2.1
8. Soukup Field	Neighborhood	1.5
9. Sunrise School Ground	Neighborhood	5.5
10. Sunset Park	Community	38.3
11. Sunset School Ground	Neighborhood	4.5
12. West Side School Park and Playground	Neighborhood	<u>2.4</u>
	Total	98.0

Source: Door County Outdoor Recreation Plan 1974-1978.

MAP 6 **RECREATION AREAS OF STURGEON BAY**



The park system is maintained and coordinated by a Park and Recreation Committee of the City Council and by a full-time recreation director. Maintenance is performed by two street department employees and during the summer months six additional employees are hired to assist with park operations.

Most recommendations for existing parks were for general maintenance and minor upgrading of what is already there. Very little additional land acquisition was recommended. However, recommendations for new areas included more shoreland added for public usage, increased facilities to meet boating and fishing demands such as docks and boat ramps. Other considerations are to upgrade the county fairgrounds for year-round use and to acquire poorly drained areas that are undeveloped for open space purposes.

LAND USE

The proposed site is entirely owned by Wisconsin Public Service Corporation (WPSC). The 426 acres is primarily grass and woodlands. The exception to this is the power station and transmission lines on site, two boat launching facilities and local roads. No family dwellings are located on this parcel. See Map 7 for land use on the site.

TRANSPORTATION NETWORK

Transmission Lines

Accompanying every electric generating plant is a network of transmission lines distributing power to its service area. A power plant of this size may require 345 kilovolts (kV) to serve this purpose.

A substation, owned by WPSC, is located on the site with two 138 kV lines leading off the property to the west and to the southwest. Two 69 kV lines also leave the site, one to the north and one to the west. If a 345 kV line was necessary, right-of-way easements would have to be purchased between the site and the nearest 345 kV line, which currently runs from the Kewaunee Nuclear Plant to the City of Green Bay, 25 to 30 miles away. See Map 8 for location and sizes of existing transmission lines.

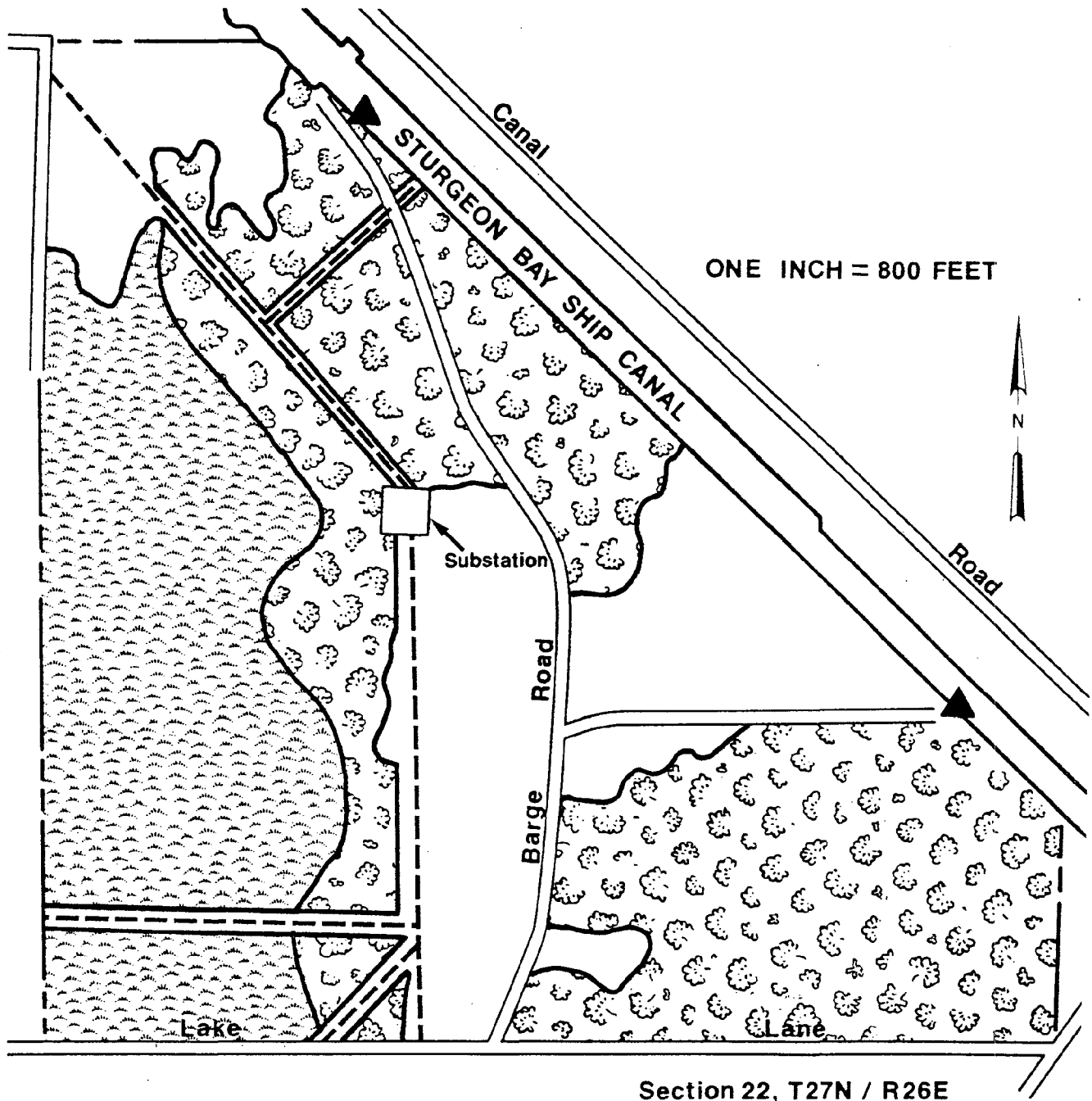
Roads

The only access roads to the proposed power plant site are local roads, which are designed for low density traffic volumes. Sturgeon Bay is two miles away. Because of this, the site is somewhat accessible and the roads could be upgraded to serve the facility. County Trunk Highway U, located one and a half miles west of the site is the nearest county highway other than the local roads in the area.

During peak construction an estimated 450 to 550 employees each day will travel these roads. These local roads were not built to facilitate such high volumes of traffic, and will probably have to be upgraded to some extent to handle the predicted increases.

MAP 7
LAND USE

PROPOSED DOOR COUNTY POWER PLANT SITE



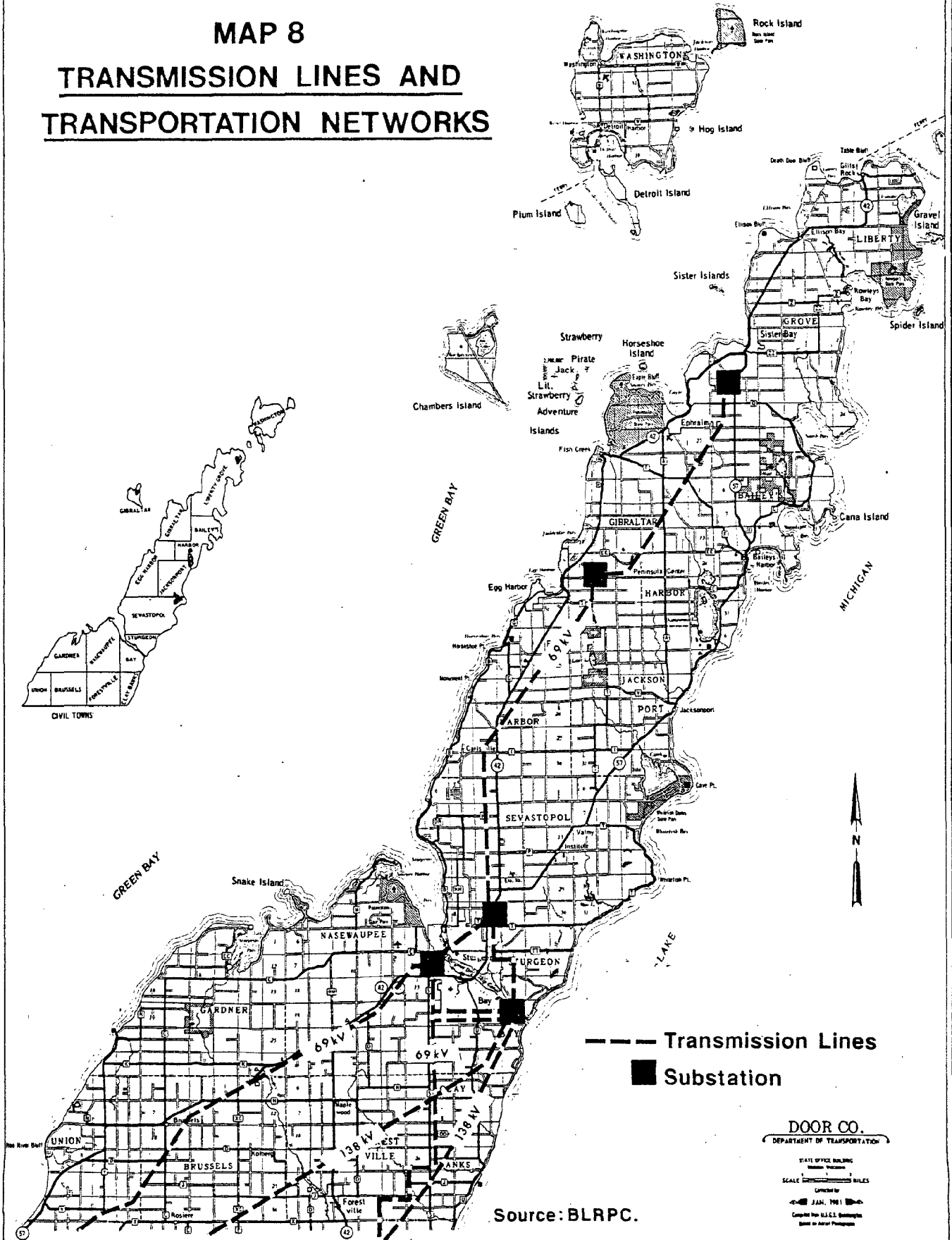
LEGEND

- | | | | |
|--|-----------|--|-------------|
| | Grassland | | Wetland |
| | Woodland | | Boat Launch |

Source: BLRPC

--- Transmission Line

MAP 8 TRANSMISSION LINES AND TRANSPORTATION NETWORKS



Waterways

Since no railroad system extends into Door County, coal shipments would have to come by water. Sturgeon Bay is considered a limited cargo port, meaning that it handles one or two types of cargo and that the port only serves users in the immediate area. More than 88% of the commodities shipped through the port are petroleum and coal products; most of which passes through the Sturgeon Bay Ship Canal to ports on Green Bay.

The Sturgeon Bay Canal connects Lake Michigan and Green Bay, and serves as the northern boundary for the site. Coal shipments by ship or barge could be delivered directly to the site by means of the canal or the lake. The coal receiving dock would probably be located in the lake.

Shipments to this site would depend on the origin of the coal. If western coal was utilized, shipments could come from the Superior Midwest Energy Terminal (SMET) in Superior, Wisconsin. This facility currently supplies coal to the Detroit Edison Utility Company and could easily supply other users. Midwestern coal could come from the southern Lake Michigan area or an Ohio port.

CONSTRUCTION PHASE IMPACTS

The construction phase of the power plant project could last as long as four years. Peak employment will incorporate 450 to 550 persons, most from the construction trade. A large portion of the skilled work force will probably have to come from areas outside Door County, since there is a limited labor force in the area. Apprenticeships and miscellaneous jobs may be made available for the local workforce who are out of work at that particular time.

Impacts during this phase can be expected to be more severe than any other phase, but it is a temporary period. The social environment will be impacted due to the sudden influx of such a large number of people into the area. Physical impacts will be created by heavy equipment use for clearing the site and constructing the facility. Surface erosion, dust and noise will all be constant impacts during this phase.

Utility shared taxes are paid to the town and the county in which the construction site is located. This tax money assists the governmental units cover any additional costs related to the utility development.

Work Force

During the construction period of the plant, as many as 450 to 550 people may be employed. The primary employment will consist of various construction trades, e.g. electricians, pipe fitters and boilermakers. Unless the construction site is near a major metropolitan area, most of the work force will have to be brought in from other areas. This could easily be the situation at the Sturgeon Bay site. The county as previously stated has less than 400 construction tradesmen. Green Bay has a large construction trades force, numbering over 2,200. However, the city is over 40 miles away, and this situation may reduce the number of potential workers that will commute on a daily basis. Manitowoc also has a large labor force, but is nearly 60 miles away.

It is likely that most of the construction work force that is not from the area will relocate to be closer to the site. Social impacts will be a factor if this is the case. See Table 5 for types of construction trades required during construction of a similar facility.

TABLE 5
PROJECTED MANPOWER
BREAKDOWN OF PEAK WORK FORCE BY TRADE

Laborers	41
Carpenters	18
Op. Engineer	21
Iron Workers	25
Boilermakers	78
Electricians	77
Pipe Fitters	64
Millwrights	20
Insulators	28
Miscellaneous	78*
	<hr/>
	450

* Miscellaneous includes Masons, Roofers, Sheet Metal Workers, etc.

Source: Environmental Impact Statement - Weston
3 Power Facility

LABOR RELATED IMPACTS

Local Services

The area around the site, especially the City of Sturgeon Bay will probably be impacted because of the potentially large number of employees relocating into the area. Housing, schools, public utilities and other services will have increased demands. This, of course, is the purpose of the utility shared tax. Many impacts on the community, in addition to impacts on community services, would have to be expected.

TRAFFIC

During the construction phase, traffic will increase substantially in the vicinity of the work area. Commuter traffic would be the largest mode in volume. An estimated peak employment of five hundred could mean a substantial increase in auto traffic each day. Truck traffic will increase with the shipment of construction equipment and building materials. According to Sargent and Lundy Engineering who did a traffic analysis for the Weston 3 plant, approximately 50 deliveries would be made each day to the site by truck.

The local roads to the site were not designed to handle the large volume of weight or traffic that would be created by the construction. Upgrading and some rebuilding would be necessary.

ECONOMIC ENVIRONMENT

Employment

Additional employment created by the plant other than the construction labor force is dependent upon increased demand put on various sectors by the construction labor force. If many people relocate, changes in the community employment status can be expected. Jobs in the service and retail/wholesale sectors would be most enhanced according to the U.S. Chamber of Commerce study "What New Jobs Mean to a Community."

Utility Shared Tax

As the shared tax is currently structured, the first four years after the construction phase is started, the Town of Sturgeon Bay and Door County will both receive \$100,000 from the utility tax revenue. This tax is distributed to the local governments by the state to help local governments with added costs such as public services and road maintenance created by the impacts of the power plant construction. The current shared tax structure is subject to changes before the 1988 construction date. See Table 6.

PHYSICAL ENVIRONMENT

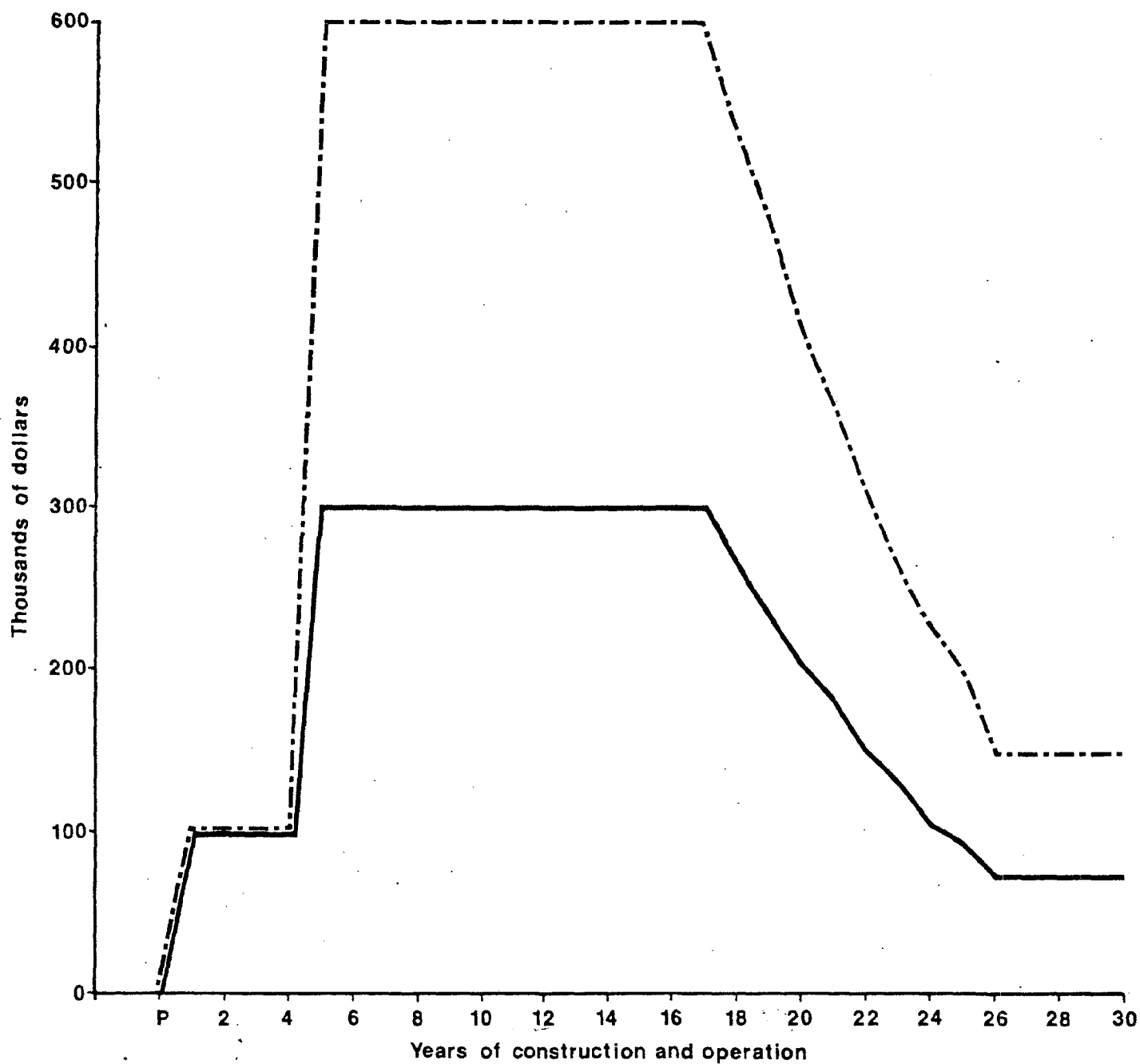
Surface Water

The effects the construction phase will have on the surrounding waters would be relatively local to the area, and short term. An increased amount of suspended solids would enter the surface water from airborne particles, but the primary source would be from surface runoff. If the placement of the intake structures and discharge outfall pipes require underwater construction, this will be another source of sediment material entering the surface water.

Noise

Sound levels are expected to be high during construction periods, especially during moments when many pieces of equipment operate simultaneously and at full load. The Department of Housing and Urban Development (HUD) recommended level for external noise exposure could be exceeded. If the construction pattern of this facility is similar to the Weston 3 facility near Wausau, construction activities would be confined to daylight hours, five days a week. However, if the project begins falling behind schedule, night work would probably occur. Distance from the noise source dilutes the sound, and the rural setting minimizes the impacts on any large concentration of people. Trees and earth berms would also break up the sound; it is not known whether these types of barriers will be constructed around the plant.

Table 6
UTILITY SHARED TAX PAYMENT



— Amount paid to Town

- - - Amount paid to County

P Pre-engineering costs prior to construction; no money returned to Town or to County

(These payments are due to ad valorem taxes on one 400 megawatt power plant) Sandberg, 1979

SOURCE: Peter Zieman. Selected Social and Economical Impacts of Power Plants.

Fish

In 1978, the U.S. Army Corps of Engineers reported in the Environmental Impact Statement (EIS) for the Weston Power Plant Project in Marathon County, that construction impacts upon the fish would be minor during active construction because fish would simply avoid the area. However, the Weston site is on the Wisconsin River, rather than a large body of water. Whether the impact characteristics would be the same at the Sturgeon Bay site is not known; but if this site is selected to house the facility an Environmental Impact Statement (EIS) would be required which would define the local impacts.

Wildlife

Nearly the entire 426 acres of the proposed site is wildlife habitat which will be destroyed due to the development of the site. As reported in the Weston Generating Stations EIS, the emigration of medium to large sized mammals to other areas would cause increased densities and stresses in other areas. Nearly complete destruction of mammals now inhabiting the site such as rabbits, ground squirrels, and mice is expected. Birds are more mobile and should not be affected a great deal.

Impacts on surrounding habitat, due to the noise and the dust, may be as severe as the immigration of displaced mammals. A comprehensive study of the surrounding areas environment and characteristics must be completed before impacts can be positively identified. The EIS would incorporate all of the necessary information about the area's wildlife habitat.

OPERATION PHASE IMPACTS

The operation phase of the power plant is expected to last for at least thirty years. The seventy employment positions required for the operation and maintenance of the facility will be permanent. Impacts of this small influx of people will be much more easily handled than the construction phase influx.

Physical impacts caused by the operational phase will primarily consist of thermal pollution to surface waters and air quality impacts from coal storage, fly ash disposal and the emissions.

When the plant stops operation it has been the practice of utilities to disassemble the facility, remove it and prepare the site for a new land use.

Transportation

Vehicle movement on the road systems to and from the power plant site will be minor in comparison to the construction phase. Traffic from the seventy employees, service vehicles and current users will be the extent of use.

Coal movement to the site will probably come by water, but the origin of the coal is not yet known. Several options are available for coal shipments to this area. For instance, if western coal was desired, the Superior Midwest Energy Terminal (SMET) in Superior, Wisconsin is the primary handler of western coal in the Great Lake Region. Southern Illinois and Indiana coal would be shipped via the Chicago shipping port, and Appalachian coal would probably be shipped out of an Ohio port such as Ashtabula or Conneaut.

Other coal transshipment facilities in the planning stages today may be a future source for shipping. Burns Harbor in Indiana is exploring the possibility of constructing a coal transshipment facility. Similar studies are being done in Green Bay and Kewaunee.

Employment

The power plant in the operational phase will employ approximately seventy people. Most of these positions are highly technical or administrative and will first be offered to WPSC personnel located in other areas. It is conceivable that few openings will be available to county residents. The multiplier effect created by the influx of seventy new residents will cause a small boost to the local economy. The particular multiplier effect used for the Weston 3 power plant project, estimated 48 additional jobs would be created from this immigration. Table 7 lists the type of additional employment that can be expected from the power plant project.

TABLE 7
EMPLOYMENT CHANGES TO SERVE
70 NEW INDUSTRIAL WORKERS AND THEIR FAMILIES

	Number of People
Wholesale and Retail Trade	15
Construction	2
Professional and Related Services	12
Transportation, Communication, and Other	
Public Utilities	8
Business and Personal Services	4
Finance, Insurance, and Real Estate	4
Industry not Reported	3
TOTAL	<u>48</u>

Source: Economic Analysis and Study, What New Jobs Mean to a Community; Washington, D.C., Chamber of Commerce of the U.S., 1973, and Environmental Impact Statement - Weston 3 Power Facility.

ECONOMIC ENVIRONMENT

Utility Tax

Wisconsin Public Service Corporation pays special utility taxes to the state which in return would redistribute the money to the Town of Sturgeon Bay and the county. The purpose of this tax is to help communities offset additional costs that the facility imposes. If the plant began operation today under the current shared tax structure, the payments would begin at the maximum rate of \$300,000 per year to the Town of Sturgeon Bay and \$600,000 per year to the County. As the plant depreciates, the tax payments will decline. Payments to the town and county should not decline below \$300,000 and \$600,000 respectively until the plant is about twenty years old. Then payments will decrease over time to a minimum level of \$75,000 yearly to the town and \$150,000 to the county. This structure will probably experience changes before the 1992 start-up data. See Table 6.

Property Value

The effects a power plant will have on property value in surrounding areas differ from site to site, and are hard to predict. A report by the Coastal Zone Management Development Program called "Local Economic Impacts of Power Plant Siting in Wisconsin" studies the effects of seven Wisconsin facilities on surrounding property values.

The four sectors in the study group are residential, mercantile, manufacturing, and agricultural. The residential sector experienced positive impacts with the exception of the Valley plant. It is speculated that the Valley felt no impacts because of its location in the City of Milwaukee, which is too large to be influenced by a single project. Mercantile impacts generally

followed the residential patterns. Manufacturing property values are more influenced by the availability of labor, materials and market place than by a placement of a power plant. The agricultural sector is traditionally the most negatively impacted. Agriculture usually has the lowest per acre value of the four sectors, and tends to be replaced by the others as growth occurs.

Community Services

If most of the seventy utility positions are filled by people from outside the area, the City of Sturgeon Bay is a likely location for many to settle. The influx of new employees and their families could number 150 to 200 new residents. In a small community this influx could add stress on some of the local community services. The city can easily plan and adjust to this influx however, due to the permanence of the positions.

PHYSICAL ENVIRONMENT

Land Use

Land use on the site other than plant facilities differs at each plant. Many utilities absorb all available land on the site and no other use occurs. But some utilities plan for parcels to be used in a recreational, agricultural or open space modes. Because the 426 acre site is not large enough for solid waste storage, the storage area must be located elsewhere. Without the storage area on site, a large parcel of land might be put aside to remain in its present state. Preliminary plans of the facility layout are not available at this time.

Power plants sometimes attract other industrial growth to the immediate area, depending upon the characteristics of the area. Frequently, agricultural or open space is replaced by the industrial growth around the plant.

Water Quality

At a power plant site both surface and ground water sources are potentially threatened by plant operations. Ground water could potentially be affected by leaching of the solid waste disposal area. Although a clay liner is installed to prevent the seeping of these products, some seepage will occur. The site is designed to keep infiltration at a minimum, and natural processes of the soil should remove impurities in leachate before it would do harm to surrounding domestic wells.

The primary concern to surface water is the thermal effects. Discharge from the cooling process is a warmer water than the temperatures of the adjacent surface water. The Wisconsin Administrative Code, Section NR 102.05 contains the standards for thermal discharge.

NR 102.05 Lake Michigan and Lake Superior thermal standards. For Lake Michigan and Lake Superior the following thermal standards are established so as to minimize effects on the aquatic biota in the receiving waters.

(1) (a) Thermal discharges shall not raise the receiving water temperature more than 3° F above the existing natural temperature at the boundary of mixing zones established in paragraphs (b) and (c).

Air Quality

One of the major impacts associated with coal fired power plants is the emission of atmospheric pollutants. The three pollutants that are most associated with these power plants are particulate matter, sulfur oxides and nitrogen oxides. These three pollutants are the most heavily regulated and widely studied pollutants generated by coal fueled power plants.

Some of the information used in the following air pollution impact analysis came from such sources as: Energy in Americas Future; Wisconsin Natural Resources, May-June 1980; Activities, Effects and Impacts of the Coal Cycle for a 1000-MW Electric Power Generating Plant; National Geographic, November 1981; and Energy Facility Impacts.

In 1975 the electric utility industry accounted for 20% of all particulate matter in the United States, according to the U.S. Nuclear Regulatory Commission in the report, Activities, Effects and Impacts of the Coal Cycle for a 1000-MW Electric Power Generating Plant. Nearly 99% of this matter can be collected through current technologies used in today's generating facilities. The one percent that is not collected, however, are the fine particulates. Recent studies show that these fine particulates commonly have such trace metals as arsenic, cadmium, manganese, mercury, nickel and vanadium. Many of these elements are toxic and may have long term effects. Some effects associated with particulate emissions are:

- Toxic materials carried into the respiratory tract.
- Reduction of direct sunlight.
- Reduced visibility.
- Interference with plant physiology.
- Adverse effects on animals that have ingested particulate covered plants.

Power plants account for 28% of all nitrogen oxides (NO_x) emitted in the United States. Most of the NO_x produced from the combustion of coal is nitric oxide (NO) and nitrogen dioxide (NO₂). Nitric oxide is not generally a threat to human health of the environment, however, it can be converted to NO₂ which can be a threat. Some effects of nitrogen dioxide upon the environment include:

- Levels above 100 ppm are lethal to most animals.
- Repeated exposure in sub-lethal doses has resulted in early pulmonary emphysema-type lesions in experimental animals.

- NO₂ may have a significant role in chronic lung disease, corrosion damage and reducing the yield of selected crops.
- NO₂ is a possible cause of acid rain.

Over 64% of the sulfur oxides (SO_x) emitted in this country comes from the electric utility industry. The main element of SO_x formed during the combustion of coal is sulfur dioxide (SO₂). Sulfur dioxide is the major environmental concern associated with burning coal to generate electricity. In general, SO₂ is not a major health or environmental problem. It is only after SO₂ is emitted into the atmosphere and various chemical reactions take place, that it is capable of environmental damage. When SO₂ is emitted into the atmosphere a part of it oxidizes, forming sulfuric acid. Some of the effects that SO₂ can have on human health and the natural environment include:

- Severe respiratory reactions
- Chronic obstructive lung disease
- Probable impacts on the yields and growth of selected crops
- Possible cause of acid rain

Acid rain may be one of the most significant environmental problems of the 1980's. This phenomenon occurs when the oxides of sulfur and nitrogen mix with atmospheric water vapor creating sulfuric and nitric acids. Much is yet to be learned about acid rain and its impacts upon human health and the natural environment. Aquatic environments are the most sensitive to increased levels of acid, but acid rain is also suspected to threaten: forests, crops, soils, wildlife, groundwater and possibly human health. The Clean Air Act has been the major tool used in controlling air pollution by new pollution sources by establishing emission standards. To comply with these standards the plant will be constructed with modern technologies. Many of the impacts associated with older coal fire power plants have been eliminated.

SUMMARY

The Sturgeon Bay site is one of four sites selected by Wisconsin Public Service Corporation as a potential site for a coal fired power plant. Certain criteria had to be met to be considered for the siting of a facility such as this. The physical features of the area such as bedrock, soils and water availability is essential for plant operations. These features often are not exact but must be able to be altered. Natural features such as fish and wildlife have no actual bearing on the construction or operation of the plant, but are an important consideration for the siting of the plant.

Economically, a project such as this would be a definite asset to the local government units. The additional revenues from the utility taxes, the influx of people and the creation of new jobs can only strengthen a community.

Transportation in the area is not a strong feature for this site. Only local roads lead to the site, so before any increase in use occurs reconstruction would be necessary. No railroad networks lie within miles of the site, and a coal dock facility would have to be constructed.

The construction phase is expected to last as long as four years. At peak employment it is estimated that between 450 and 550 people will be employed. Because of the need of a large number of skilled tradesmen in the construction field, all areas within commuting range will benefit from the employment opportunities, as well as some tradesmen from other areas of the state.

Aesthetically and physically the construction phase may be the worst period of time. The noise, dust, erosion and other disruptions will be at a peak and constant. Construction of the water intake and outfall as well as construction runoff could be expected to cause turbidity at least in the area of the site. Noise and dust not only will affect residents in the area but will impact wildlife habitat in the area. Overall the impacts will be significant during construction, but they are temporary.

The operation phase is expected to last for at least thirty years and to employ approximately seventy people during this period. Impacts will be less potent during this phase for several reasons. First, the community can plan and make appropriate changes because it is a long range effect. Second, although the plant does have aesthetic and physical impacts, they are in the most part minor compared to the construction phase.

The site may be attractive to the utility for several reasons. Wisconsin Public Service currently owns this parcel and would only have to acquire land for an ash disposal site; the abundant water source for operational purposes would create no problems even during low water years; and the power plant may find coal shipments by water to be less costly than unit trains, and the potential for receiving coal via Great Lakes does exist.

Negative points about this parcel include its small size and high water table which preclude on-site solid waste disposal, the location of the plant in comparison to the major source of electrical demand, the distance to existing 345kV transmission lines, and no railroad services this area if unit train deliveries were preferred.

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